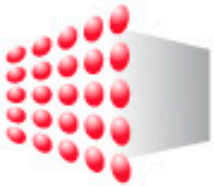

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Opportunities and Challenges for Micro-grids in Southeast Asia

Valerie Choy

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Work on Micro-Grids at ESI

- Feasibility assessment of micro-grids for Southeast Asia from economic, technical and social perspectives
- Engage stakeholders (industry, NGOs, policy makers, universities) in Southeast Asian nations to seek out ground truths
- Work with energy services companies (ESCOs) to understand their experiences
- Evaluate the diverse energy needs and potential for micro-grids in the region and the individual countries
- Carve out innovative business models

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Micro-grids and Rural Electrification

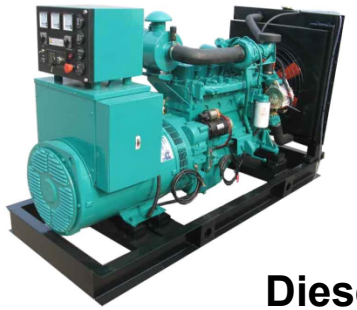
Mini-hydro

Community Clinic

Village Homes

Solar PV

Agriculture (water pumping)



Diesel Gen Set

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Opportunities for Rural Electrification

160 million people in South-east Asia have no access to electricity today

Thailand is 99.3% electrified but remote island, resort and mountainous communities and national parks are still in need of a steady off-grid electricity supply

Indonesia has more than 80 million people without electricity, mostly in the more sparsely populated islands outside of Java and Sumatra

In Vietnam, 3 million people in 1100 mountainous communities are excluded from the government's grid extension plans

In Malaysia, 10 to 20% of the population in Sabah and Sarawak remain disconnected from the national grid

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Solutions for a Unique but Diversified Southeast Asia

Culture

Economics

Politics

Geography

Financing Mechanisms

Income Levels

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Some Challenges

- Government mandates low electricity tariffs for rural consumers
- State controlled utility grids already operating at a loss in rural areas
- Low levels of trust deter financing institutions
- Short term and ill-informed political agendas
- Cultural attitudes
- Sparse, dispersed communities living on harsh terrains
- Violently destructive natural disasters

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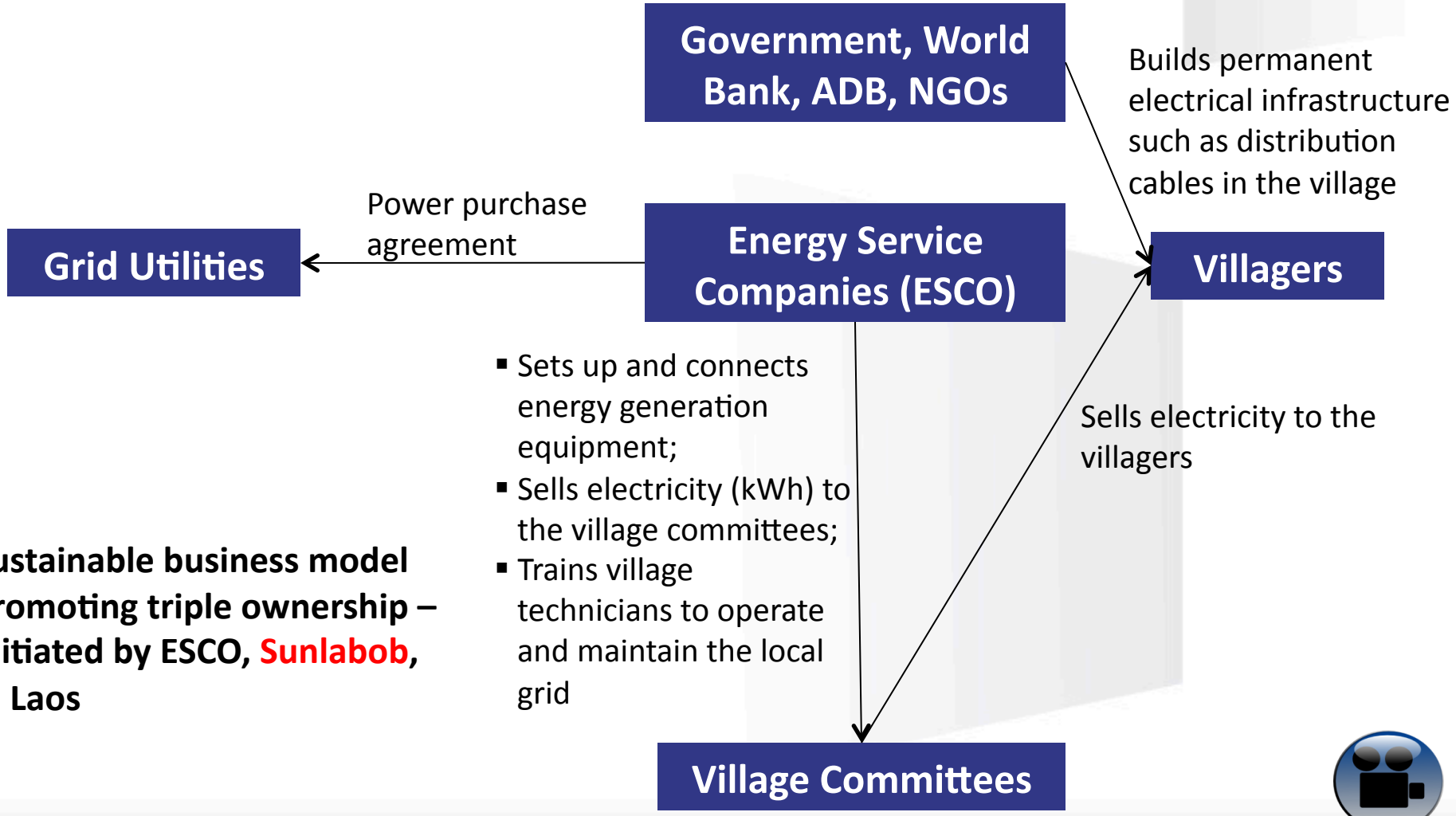
An Integrated Financing/ Operations Model



- Sets up and connects energy generation equipment;
- Sells electricity (kWh) to the village committees;
- Trains village technicians to operate and maintain the local grid

Sustainable business model promoting triple ownership – initiated by ESCO, Sunlabob, in Laos

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Preliminary Conclusions

- Joint **public**, **private** and **people** buy-in for micro-grid projects essential for long term sustainability

- Choice and size of energy systems must fit the needs profile of the community and its **willingness to pay**

- Deployment of micro-grid systems must have **sound economic backing**

a) Less diesel oil/kerosene used results in cost reduction
b) Increase in income generation activities
c) Boost in community welfare and education

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Preliminary Conclusions

- **Cultural tendencies** must be considered in designing business models, systems and financing mechanisms

- Southeast Asia is a diverse region – business models must be routinely re-evaluated and **locally optimized** to fit the unique conditions of the various rural communities

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Pulau Ubin as a Test-bed for Micro-grids

Organized by the Energy Market Authority and jointly maintained by several private vendors, the Pulau Ubin site aims to:

a) Test-bed micro-grid infrastructure (max load of ~1.7MW)

b) Integrate several clean and renewable energy sources into the micro-grid for test-bedding

Old granite quarries may be used as pumped storage hydro systems

Disused prawn farms for algae cultivation

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Thank You!

Questions?

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